
Herpes Zoster at School-Age: A Case Presentation and Discussion of the Unique Aspects Within the Pediatric Population

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This paper is a case presentation and discussion of a 12-year-old boy previously in excellent health who presents with dermatomal herpes zoster. Although not unheard of, the occurrence of herpes zoster in the pediatric population is infrequent. This case provides the opportunity to address many of the aspects of herpes zoster that are unique to the pediatric population including epidemiology, pathophysiology, management and course, and the potential impact of the live attenuated varicella vaccine, recently approved for the prevention of the primary varicella infection, chickenpox.

Case Report

A twelve-year-old Chinese-caucasian male was well and in his usual state of excellent health, when on one Friday morning while at school he complained of a sharp, tingling pain on the back of his neck. The school nurse noticed a small papular, erythematous eruption in the region of the neck from which the patient had complained. The patient was found to have a low grade fever as well. His mother was notified and the patient was sent home. The mother attempted to relieve the symptoms by applying *Lanacaine* ointment and calamine lotion without much success. The next morning, Saturday, the extent of the eruption had spread following the C3 dermatome down the left side of his neck and up to the back of his hair line. The eruption had become vesicular and more erythematous. The patient also reported some weakness in his left arm. The patient was brought into the clinic and upon further questioning denied any

recent outdoor treks, travels, changes in clothes, detergents, or soaps. The mother reported that the patient had had a *mild* case of chickenpox at a *very early age* and has otherwise been extremely healthy without any recent increased frequency of illnesses, weight loss, or night sweats.

On physical exam, the patient was a well developed 12-year-old male, nontoxic appearing but in moderate distress due to the painful lesions on the left side of his neck. Vital signs were within normal limits. The lesions on the left side of his neck had an erythematous, mildly edematous base with superimposed oval-round vesicles. The eruption extended down the left side of the neck to the mid-clavicular region with a few isolated lesions over the acromioclavicular region. It extended up to his hairline with some scalp involvement. Eyes and ears were not involved. There was a mild degree of weakness on flexion against resistance on his left upper extremity. Sensory and coordination were intact. The remainder of the exam was entirely within normal limits.

A presumptive diagnosis of herpes zoster was made based on the history and physical findings. No confirmatory tests such as a Tzanck preparation, viral culture, biopsy, or immunofluorescence were performed. Based on the patient's history of excellent health, a workup of the patient's immunocompetence was deemed unnecessary. The patient was started on oral acyclovir. On follow up five days later, there was marked improvement. The number of lesions had decreased markedly and the existing lesions had dried and crusted over. The patient reported that he had regained his strength in his left arm.

Discussion

The recognition and diagnosis of dermatomal herpes zoster in adults and children is straightforward. Although not unheard of, the occurrence of herpes zoster in the pediatric population is infrequent. This case provides the opportunity to address many of the aspects of herpes zoster that are unique to the pediatric population.

Epidemiology

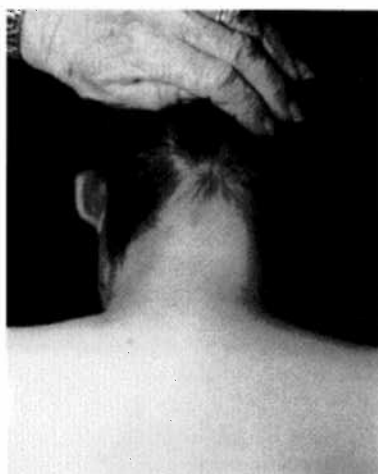
With an estimated 3 million cases of chickenpox a year in the U.S., greater than 95% occurring in children and adolescents, the prevalence of primary varicella zoster virus (VZV) exposure is nearly universal within the pediatric population.¹

In contrast, the incidence of herpes zoster, which is the manifestation of the reactivation of latent varicella zoster virus from within the dorsal root ganglia, is very low in childhood. In individuals less than 10 years of age, there is an estimated incidence of 0.74/1000 patients versus an estimated annual rate of 3.4/1000 for the general population.²

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Presenting findings; eruption predominantly restricted to C3 dermatome with a few isolated lesions on left shoulder.



There are several conditions or circumstances in children that have a higher incidence of herpes zoster than the general pediatric population (See Table 1). Acute lymphocytic leukemia (ALL) patients or children receiving immunosuppressive therapy, have the highest incidence of herpes zoster within the pediatric population. It has been estimated that herpes zoster occurs in 22-25% of children with ALL and a prior history of chickenpox.³ Immunocompromised children are at greater risk for disseminated herpes zoster with visceral involvement, particularly VZV pneumonia, and a 20 % mortality.² Children with HIV are commonly afflicted with herpes zoster but it rarely becomes disseminated. Herpes zoster occurring in infants is strongly associated with in-utero exposure to VZV.⁴ Children afflicted with chickenpox, the primary infection of VZV, at less than 1 year of age, have a greater predisposition for developing herpes zoster later on in their childhood, particularly before the age of 7.^{4,5}

Table 1.—Risk Factors for Herpes zoster in children

- 1) ALL and other malignancies.
- 2) Immunocompromised (treatments, HIV).
- 3) In-Utero varicella exposure.
- 4) Chicken Pox at age < 1 yr.

The dermatomal distribution of the cases of herpes zoster within the general pediatric population is similar to adults with the preponderance of cases of occurring between T2-L2. However, Terada et al. found some interesting variations in dermatomal distribution when the pediatric population was broken down by age. In children less than 7 years of age, the involvement of cervical and cranial nerve dermatomes was 41.7 % and 25 %, respectively. In children greater than 7 years of age, 78.9 % involved the thoracic dermatomes. Terada et al hypothesized that these findings may reflect the changing body proportions of growing children. If this is the case, Terada further hypothesized that the dermatomal site of herpes zoster may be a reflection of the region of highest preponderance of exanthems during the primary infection with VZV, chickenpox.⁴

Pathophysiology

It is firmly established that following primary infection, VZV remains in a latent state within the dorsal root ganglia. Herpes zoster represents the reactivation of this latent virus from within a particular ganglion. The epidemiology of herpes zoster indicate that latency and reactivation is dependent on both host and viral factors. Attempts to elicit the pathogenesis of herpes zoster have been confounded by the fact that human beings are the only known harborers of

Patient 5 days later status-post oral acyclovir. Eruption markedly improved, remaining lesions dry and crusted over.



VZV. The high incidence of herpes zoster in the immunocompromised indicates that the immune system plays a role in maintaining latency, particularly cellular immunity.⁶ The higher incidence of Herpes zoster in adults, it is believed, may reflect a natural decline in cellular immunity with age.⁶

The occurrence of herpes zoster in children is even more puzzling. In some cases, it may be the result of an immunocompromising illness or therapy, but in healthy children, it remains a mystery. Analysis of blood drawn from healthy children with herpes zoster often resembles that of a primary infection with high titers of Natural Killer Cells and IgM antibodies despite having been previously exposed to the virus.⁷ It has been hypothesized that this apparent loss of immunologic memory may be due to an incomplete or immature immunologic response at the time of primary exposure to the VZV. An immature immune response has been the long-held belief for the mechanism behind the higher frequencies of herpes zoster in infants exposed to VZV in-utero and in children who had a primary VZV infection at less than 1 year of age. In other children, the occurrence of herpes zoster may reflect an incomplete immune response to perhaps a mild primary VZV infection. However, a relationship between herpes zoster and the severity of primary VZV infection has not been established.

Studies of immunologic memory status have revealed that VZV specific cellular immunity is enhanced by frequent exposure to VZV.^{3,6} It is hypothesized that multiple exogenous exposures to, or subclinical endogenous reactivation of, the VZV may serve as a booster to the immunologic system and may aid in maintaining the virus in their latent state within the ganglia.

Management and Treatment

In the management and treatment of herpes zoster in children, the pediatrician may be faced with several questions that are unique to the pediatric population.

- Should anti-viral medications such as acyclovir (Zovirax), famcyclovir (Famvir), or valacyclovir hydrochloride (Valtrex) be employed? Or are there toxicities or precautions unique to the pediatric population that one should be aware of?
- Should a healthy child with herpes zoster be further evaluated for other immunocompromising illnesses?
- Is herpes zoster a precursor to a malignancy?
- Will there be any persistent neuralgia as may occur in adults?
- And the inevitable question of all parents of school age children, is the child contagious, should he stay home from school?

In most cases, herpes zoster in otherwise healthy children runs a benign course, requiring only supportive treatment with non-aspirin analgesics and local wound care. The exceptions to this are herpes zoster involving the first branch of the trigeminal nerve or within the ear canal. Forty percent of patients with initial zoster lesions occurring on the forehead and eighty percent with initial lesions on the tip of the nose, will develop ocular involvement.⁸ Because ocular and auditory involvement may lead to significant permanent impairment, more aggressive therapy may be warranted.

The indications for and usage of antiviral agents in the management of pediatric herpes zoster is still quite controversial. The safety and efficacy in children has not been established for famcyclovir and valacyclovir hydrochloride. There has been considerably more experience with the use of acyclovir. However, it still has not been adequately studied for the use on children less than 2 years of age.

In 1992, the FDA approved the use of oral acyclovir for the treatment of varicella infections in otherwise healthy children. In 1993, the American Academy of Pediatrics (AAP) released the

following recommendations for the use of oral acyclovir in varicella infections:

American Academy of Pediatrics Recommendations.⁹

- 1) Oral acyclovir is not recommended routinely for uncomplicated varicella in otherwise healthy children
- 2) for children at increased risk of severe varicella or its complications (older than 13 yrs., those receiving chronic corticosteroids or aspirin therapy, those with chronic cutaneous or pulmonary diseases), oral acyclovir should be considered, if it can be initiated within 24 hours of the rash.
- 3) When given, oral acyclovir should be administered for 5 days. The patient must maintain adequate fluid intake.
- 4) Primary varicella or recurrent zoster in immunocompromised and virus mediated complications of varicella in normal hosts should be treated with intravenous acyclovir.
- 5) Oral treatment is not recommended in pregnant adolescents with uncomplicated disease.
- 6) Oral acyclovir may be considered for household contacts because they usually have more severe illness.

In their review of the available literature and own clinical experience, Rothe et al recommended the following guidelines, specifically for the treatment of Herpes zoster in children:

Recommendations for Acyclovir for Treatment of Herpes zoster in Children.⁹

- 1) Ocular zoster in adolescents and children and pregnancy: treat with oral acyclovir and refer to an ophthalmologist for continuing care.
- 2) Zoster in adolescents: treat with oral acyclovir if identified within 72 hours of exanthem.
- 3) Zoster in children: do not treat, as it is relatively benign.
- 4) Zoster in Atopic patients receiving systemic corticosteroids: Do not treat, as it is relatively benign.

In children, acyclovir appears to be better tolerated than adults.⁸ Possible side effects are nausea and vomiting which occurs in less than 8 % and 3 % of the pediatric population, respectively.¹⁰ There is even lower incidence of diarrhea, headaches, and cutaneous eruptions. Dehydration and over-dosage may lead to renal precipitation. Renal function should be closely monitored in the neonate population.¹¹

Herpes zoster eruptions are contagious to individuals not previously exposed to the varicella virus. However, it is estimated to be only one third as contagious as primary varicella infection.¹² Transmission by direct contact with the lesions has been established. Respiratory transmission, the main mode of transmission in primary varicella infection, has not been conclusively excluded as a mode of transmission to susceptible individuals.

Although there is a higher incidence of herpes zoster in childhood malignancies, the reverse has not been found to be true. No association between herpes zoster and subsequent cancer has been found. Prospective studies of individuals with herpes zoster have shown the same incidence of malignancies as the general population.¹² From this information, it appears that further evaluation on an otherwise healthy child is unnecessary unless dictated by their history.

The occurrence of post-herpetic neuralgia in children is still questioned. In general, it can be said that herpes zoster has a much

milder course in children than adults with a minimal risk of post-herpetic neuralgia, the incidence of which is as high as 43% in some adult studies.⁸ In their study of childhood zoster over a 20 year period, Guess et al found no incidence of post-herpetic neuralgia.⁵

Live Attenuated Varicelle Vaccine

With the recent AAP recommendation of the live attenuated varicella vaccine for the prevention of primary varicella infection (chickenpox), there has been much discussion on its potential impact on the incidence of herpes zoster. It was initially hoped that with the eradication of primary varicella infection by the vaccine, there would be a similar impact upon herpes zoster. However, further studies of the attenuated vaccine virus have shown that it, too, can cause latent infection within the ganglia and dermatomal zoster eruptions upon reactivation.¹³ As a result, there has been a growing concern that there may possibly be an increase in the incidence of herpes zoster as a result of the new vaccination policies.

Current U.S. studies show no increased incidence of herpes zoster in healthy immunized children. A 4 year follow-up study of 548 children with ALL immunized against varicella actually showed a decrease in the incidence of herpes zoster.¹³ This finding was significant in that these patients are normally considered at highest risk for varicella reactivation.


There may be several explanations for the decreased incidence of zoster after vaccination. One is the virus is attenuated. Another is that the exanthem of primary varicella may be necessary for the

virus to gain access to the sensory nerves and reside within the dorsal ganglion region.

The varicella vaccine may play another role in the prevention of herpes zoster. Immunologic studies of adults receiving vaccination have shown higher levels of VZV specific T-cell levels.⁶ These findings imply that the varicella vaccine may have the potential of being used as an immunologic booster with the hope of preventing herpes zoster in adult populations as well.

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